



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8

1595 Wynkoop Street

11 August 2015

MEMORANDUM

SUBJECT: Screening Levels for Recreational Receptors at the Gold King Mine Site

FROM: Susan Griffin,

TO: Wendy O'Brien

Following the release from the Gold King Mine Site in August 5th into the Animas River, a concern exists for the safety of recreational users of the river. I've provided risk-based screening levels for inorganics in both surface water and soil/sediment for a hiker/ camper to compare to measured data. Table 1 shows screening levels for the hiker/camper exposed to surface water. These levels assume that adults and children receive all of their daily water intake (2 liters/day) from the river over a 64 day period. Table 2 shows the screening levels for the hiker/camper exposed to soils and sediments alongside the riverbank. They also assume that adults and children receive all of their daily soil intake over a 64 day period. These screening levels represent levels which are without adverse non-cancer effects over a chronic period of time. Screening levels based on shorter exposure periods (such as those expected at the Gold King Mine site) would be much higher and less conservative. The exposure assumptions for those screening levels are provided as attachment 1. The toxicity values are in attachment 2.

These screening levels represent a bounding estimate for recreational users. This means they are more conservative than screening levels for fisherman, rafters, swimmers, or other recreational users of the river primarily because their consumption of water and soil/ sediment is higher. These values don't take consumption of fish from the river into consideration. Please feel free to contact me if you have any questions (303) 312-6651.

Table 1 – Screening Values in Surface Water for Hikers/ Campers

| Analyte | Screening Level (ug/L) |
|-----------|------------------------|
| Aluminum | 170,000 |
| Arsenic | 50 |
| Barium | 33,000 |
| Beryllium | 330 |
| Cadmium | 83 |
| Chromium | 210,000 |
| Cobalt | 50 |
| Copper | 6700 |
| Iron | 120,000 |
| Lead | 200 |
| Manganese | 7800 |
| Nickel | 3300 |
| Thallium | 1.7 |
| Vanadium | 830 |
| Zinc | 50,000 |

Table 2 – Screening Levels in Soil/ Sediment for Hikers and Campers

| Analyte | Screening Level (mg/kg) |
|-----------|-------------------------|
| Aluminum | 3,300,000 |
| Arsenic | 4200* |
| Barium | 670,000 |
| Beryllium | 6700 |
| Cadmium | 1700 |
| Chromium | 4,300,000 |
| Cobalt | 1000 |
| Copper | 130000 |
| Iron | 2,300,000 |
| Lead | 20,000* |
| Manganese | 160,000 |
| Mercury | 1000 |
| Nickel | 67,000 |
| Thallium | 33 |
| Vanadium | 830 |
| Zinc | 50,000 |

*Screening levels for lead and arsenic include site-specific adjustments for bioavailability

Attachment 1

Exposure Parameters for Hikers/ Campers

| Exposure Pathway | Exposure Parameter | Units | RME Value | Source |
|--|---------------------------|--------------|------------------|---------------|
| General | Body weight older child | Kg | 44 | [4,d] |
| | Body weight adult | Kg | 70 | [1] |
| | Exposure Frequency | Days/yr | 64 | [7,a] |
| | Exposure duration child | Yr | 10 | [7] |
| | Exposure duration adult | Yr | 20 | [7] |
| | Total exposure duration | Yr | 30 | [2] |
| Ingestion of Surface Water as Drinking Water | Ingestion rate | L/day | 2 | [1,2] |
| Ingestion of soil/ sediment | Ingestion rate | Mg/day | 100 | [7,c] |
| | Conversion Factor | Kg/mg | 1E-06 | [2] |
| | Hazard Index | unitless | 1.0 | [2] |

Sources

[1] USEPA 1991. Standard Default Exposure Factors. OSWER Directive 9285.6-03

[2] USEPA 1989. Risk Assessment Guidance for Superfund. Volume 1, Part A

[4] USEPA 2011. Exposure Factors Handbook

[7] Professional Judgement

Notes

[a] Assumes exposure occurs over the course of 16 weeks at a frequency of 4 days/week

[c] Assumes soil ingestion by a hiker is similar to that of a resident

[d] Age-weighted average based on body weights of children 6-11 years old and 11-16 years old

Attachment 2

Toxicity Factors

| Analyte | RfD |
|----------------------|---------|
| Aluminum | 1.0E+00 |
| Antimony | 9.0E-04 |
| Arsenic | 3.0E-04 |
| Barium | 2.0E-01 |
| Beryllium | 2.0E-03 |
| Cadmium (non-water) | 1.0E-03 |
| Cadmium (water) | 5.0E-04 |
| Chromium (III) | 1.5E+00 |
| Chromium (VI) | 3.0E-03 |
| Chromium (6:1) | 1.3E+00 |
| Cobalt | 3.0E-04 |
| Copper | 4.0E-02 |
| Iron | 7.0E-1 |
| Manganese (food) | 1.4E-01 |
| Manganese (non-food) | 4.7E-02 |
| Mercury | 3.0E-04 |
| Molybdenum | 5.0E-03 |
| Nickel | 2.0E-02 |
| Selenium | 5.0E-03 |
| Thallium | 1.0E-05 |
| Vanadium | 5.0E-03 |
| Zinc | 3.0E-01 |